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Appl. No. 10/661,492
Reply to Office action of November 16, 2007Amendments to the Claims

The listing of claims will replace all prior versions and listings of claims in the application:

Listing of Claims:

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Claims 1-23 (Cancelled)

Claim 24 (Currently Amended): An apparatus for automatically determining a type of an external device, comprising:

- 10 a jack for coupling the external device;
an impedance detecting circuit, coupled to the external device through the jack, for
generating a first analog signal according to an impedance of the external device
and a first resistance, a second analog signal according to the impedance of the
external device and a second resistance and a third analog signal according to the
15 impedance of the external device and a third resistance, wherein the first, second
and third resistances are different three or more analog signals according to an
impedance of the external device;
an analog-to-digital converter, coupled to the impedance detecting circuit, for
converting the first, second and third analog signals to a plurality of digital values
20 which includes first, second and third digital values, respectively; and
a control circuit, coupled to the analog-to-digital converter, for determining the type
of the external device when the first digital value falls within a first predetermined
range, the second digital value falls within a second predetermined range, the third
digital value falls within a third predetermined range and all of the first, second
25 and third predetermined ranges digital values together indicate a same recognized
condition among a plurality of predetermined recognized conditions[.];
wherein the impedance detecting circuit comprises a plurality of resistors, which
couples together in parallel, for providing the first, second and third resistance.

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Claim 25 (Currently Amended): The apparatus of claim 24, wherein the impedance detecting circuit comprises:

~~a plurality of impedance elements; and~~

- 5 a switching circuit for selectively coupling at least one of the resistors ~~impedance elements~~ to the external device and thereby sequentially generating ~~[[a]]~~ the first, second and third analog signals which are respectively converted into the first, second and third values by the analog-to-digital converter.

- 10 Claim 26 (Currently Amended): The apparatus of claim 24, ~~wherein the recognized condition represents that each of the first, second and third values falls within a predetermined range; wherein at least two of the first, second and third~~
predetermined ranges are different values correspond to different predetermined
~~ranges.~~

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Claims 27-28 (Cancelled)

Claim 29 (Currently Amended): The apparatus of claim 24 further comprising:

- 20 a connection detecting circuit, coupled between the jack and the impedance detecting circuit, for determining whether the external device couples to the jack such that the impedance detecting circuit generates the plurality of first, second and third analog signals when the connection detecting circuit determines the external device being coupled to the jack.

- 25 Claim 30 (Previously Presented): The apparatus of claim 24, wherein the control circuit disconnects the coupling relation between the impedance detecting circuit and the jack after determining the type of the external device.

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Claim 31 (Previously Presented): The apparatus of claim 30 further comprising:
a multiplexing circuit for coupling the external device to an internal circuit according to the type of the external device determined by the control circuit.

5 Claim 32 (Previously Presented): The apparatus of claim 24 further comprising:
a decoder, coupled to the control circuit, for receiving a first number of outputs from the control circuit and thereby generating a second number of outputs;
wherein the second number is larger than the first number.

10 Claim 33 (Currently Amended): A method for automatically determining a type of an external device, comprising:
providing a plurality of predetermined resistances by a plurality of resistors coupled together in parallel;
generating a first analog signal according to a first coupling relation between [[a]]
15 the plurality of predetermined impedances resistances and an impedance of the external device;
generating a second analog signal according to a second coupling relation, which is different from the first coupling relation, between the plurality of predetermined impedances resistances and the impedance of the external device;
20 generating a third analog signal according to a third coupling relation, which is different from the first and second coupling relations, between the plurality of predetermined impedances resistances and the impedance of the external device;
respectively converting the first, second and third analog signals to first, second and third digital values; and
25 determining the type of the external device when the first digital value falls within a first predetermined range, the second digital value falls within a second predetermined range, the third digital value falls within a third predetermined range and all of the first, second and third ranges digital values together indicate a

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same recognized condition among a plurality of predetermined recognized conditions.

Claim 34 (Currently Amended): The method of claim 33 further comprising:

- 5 ~~decoupling the first impedance element~~ a first resistor of the plurality of resistors
 from the impedance of the external device before coupling ~~the second impedance~~
 ~~element~~ a second resistor of the plurality of resistors to the impedance of the
 external device;
- 10 decoupling the second ~~resistor impedance element~~ from the impedance of the
 external device before coupling a third resistor of the plurality of resistors ~~the~~
 ~~third impedance element~~ to the impedance of the external device; and
 decoupling all of the plurality of resistors ~~first, second and third impedance elements~~
 from the impedance of the external device after constituting the recognized
 condition.

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Claim 35 (Currently Amended): The method of claim 33, ~~wherein the recognized~~
~~condition represents that each of the first, second and third digital values falls within~~
~~a predetermined range; wherein at least two of the first, second and third~~
20 predetermined ranges are different ~~digital values correspond to different~~
 ~~predetermined ranges.~~

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Claims 36-37 (Cancelled)

Claim 38 (New): An apparatus for determining a type of an external device, comprising:

- 25 a jack for coupling the external device;
 an impedance detecting circuit, coupled to the external device through the jack, for
 generating a first analog signal according to an impedance of the external device
 and a first resistance, a second analog signal according to the impedance of the

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external device and a second resistance and a third analog signal according to the impedance of the external device and a third resistance, the impedance detecting circuit comprising:

- 5 a plurality of detecting paths coupled together in parallel, each of the detecting paths comprising a resistor and a transistor coupled together in series, and on/off conditions of the transistors determining the first, second and third resistances;
- 10 an analog-to-digital converter, coupled to the impedance detecting circuit, for converting the first, second and third analog signals to first, second and third digital values; and
- 15 a control circuit, coupled to the analog-to-digital converter, for determining the type of the external device when the first digital value falls within a first predetermined range, the second digital value falls within a second predetermined range, the third digital value falls within a third predetermined range and all of the first, second and third predetermined ranges together indicate a recognized condition among a plurality of predetermined recognized conditions;
- wherein the first, second and third resistances are different.

20 Claim 39 (New): The apparatus of claim 38, wherein the plurality of detecting paths comprises:

- a first detecting path comprising a first resistor and a first transistor coupled in series;
- a second detecting path, coupled to the first detecting path in parallel, comprising a second resistor and a second transistor coupled in series; and
- 25 a third detecting path, coupled to the first and second paths in parallel, comprising a third resistor and a third transistor coupled in series;
- wherein the first resistance is determined when the first transistor is switched on and the second and third transistors are switched off, the second resistance is

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determined when the second transistor is switched on and the first and third transistors are switched off and the third resistance is determined when the third transistor is switched on and the first and second transistors are switched off.

- 5 Claim 40 (New): The apparatus of claim 38 further comprising:
a connection detecting circuit, coupled between the jack and the impedance detecting circuit, for determining whether the external device couples to the jack such that the impedance detecting circuit generates the first, second and third analog signals when the connection detecting circuit determines the external device being coupled to the
10 jack.

Claim 41 (New): The apparatus of claim 38, wherein the control circuit disconnects the coupling relation between the impedance detecting circuit and the jack after determining the type of the external device.

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Claim 42 (New): The apparatus of claim 41 further comprising:
a multiplexing circuit for coupling the external device to an internal circuit according to the type of the external device determined by the control circuit.

- 20 Claim 43 (New): The apparatus of claim 38 further comprising:
a decoder, coupled to the control circuit, for receiving a first number of outputs from the control circuit and thereby generating a second number of outputs;
wherein the second number is larger than the first number.

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Amendments to the Drawings

5 The attached sheets of drawings include changes to figs. 1 and 3 and replace the original sheets of figs. 1 and 3. In figure 1, an analog-to-digital converter 14 has been depicted and a typo "Coutrolling device" been corrected to be "Controlling device". In figure 3, an analog-to-digital converter 404 has been depicted and typos "Coutrolling device" and "Switching deuce" been respectively corrected to be "Controlling device" and "Switching device".

10 Attachment: Replacement Sheets